



Clean Air Act Advisory Committee Meeting – MSTRS

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Introduction: SmartWay™ Update

- Today I will briefly cover two topics in EPA's SmartWay Transport Partnership Program
 - SmartWay Get Green Trucking Summit
 - Fuel economy test procedure for heavy-duty trucks

SmartWay Get Green Trucking Summit Goals

- Reach out to owner-operators and smaller fleets
 - They represent about 70% of the industry
- Create a strong emphasis on biofuels by recognizing first wave of SmartWay Grow and Go partners using biofuels
- Highlight SmartWay loans for APUs, tires, aerodynamic fairings and for used trucks with emission controls to accelerate purchases, especially by small fleets and owner-operators
- Showcase new SmartWay-certified tractors and SmartWay-certified trailers to accelerate fleet turnover of more clean and efficient new trucks

SmartWay Get Green Trucking Summit

Effective Stakeholder Collaboration = Success

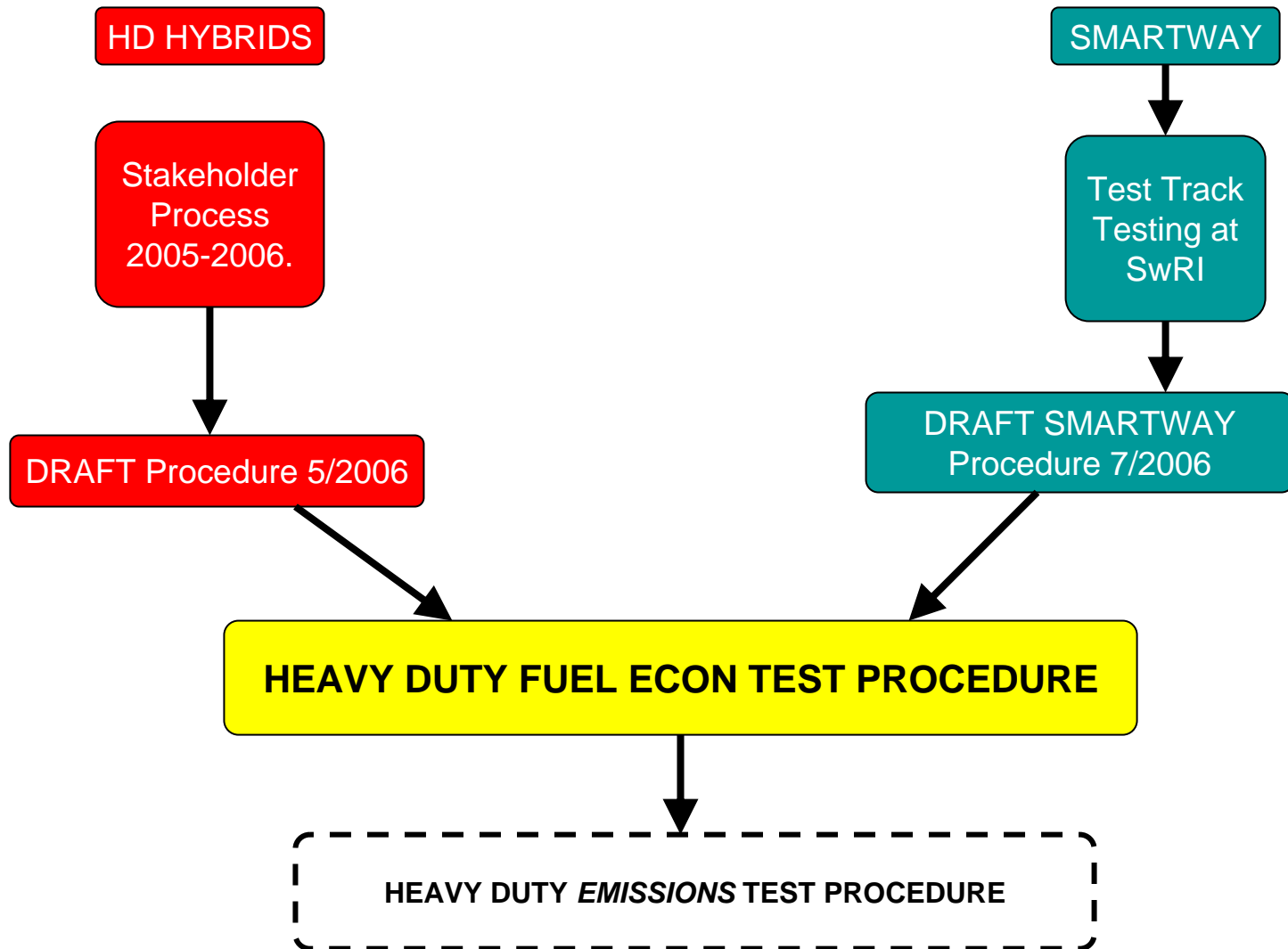
- Standing-room-only press event
 - Featured SmartWay partners and notables (Eric Harley of MTRN, Bryan Martin of Chrome Shop Mafia, Bob Meyers, Dallas Mayor Tom Leppert)
 - Country music singer Joey Holiday wrote and performed “The SmartWay Song” ©
 - National Biodiesel Board co-sponsored with EPA
- Technology providers demonstrated cleaner, more efficient technologies
 - All the major truck OEs, a trailer OE, numerous equipment OEs
- Strong traffic at SmartWay exhibit
- Extensive media coverage during & after
 - Generating a strong response to OEs and EPA

HD Fuel Economy Measurement Protocol

Context

- Industry, end users, environmental groups, and EPA have a common interest in developing an mpg test for heavy vehicles
 - Current test methods not applicable (heavy duty engine, passenger vehicle) or insufficient (SAE and TMC test HD vehicle test methods)
 - Needed for programs like SmartWay, financial incentives, and general use, to compare vehicles
- EPA-led stakeholder groups collaborated to develop a HD vehicle FE test procedure
 - Resulted in two different drafts, subsequently combined into a single outline in spring 2007
 - EPA started drafting an initial combined procedure in summer 2007

HD Fuel Economy Measurement Protocol Process



Scope

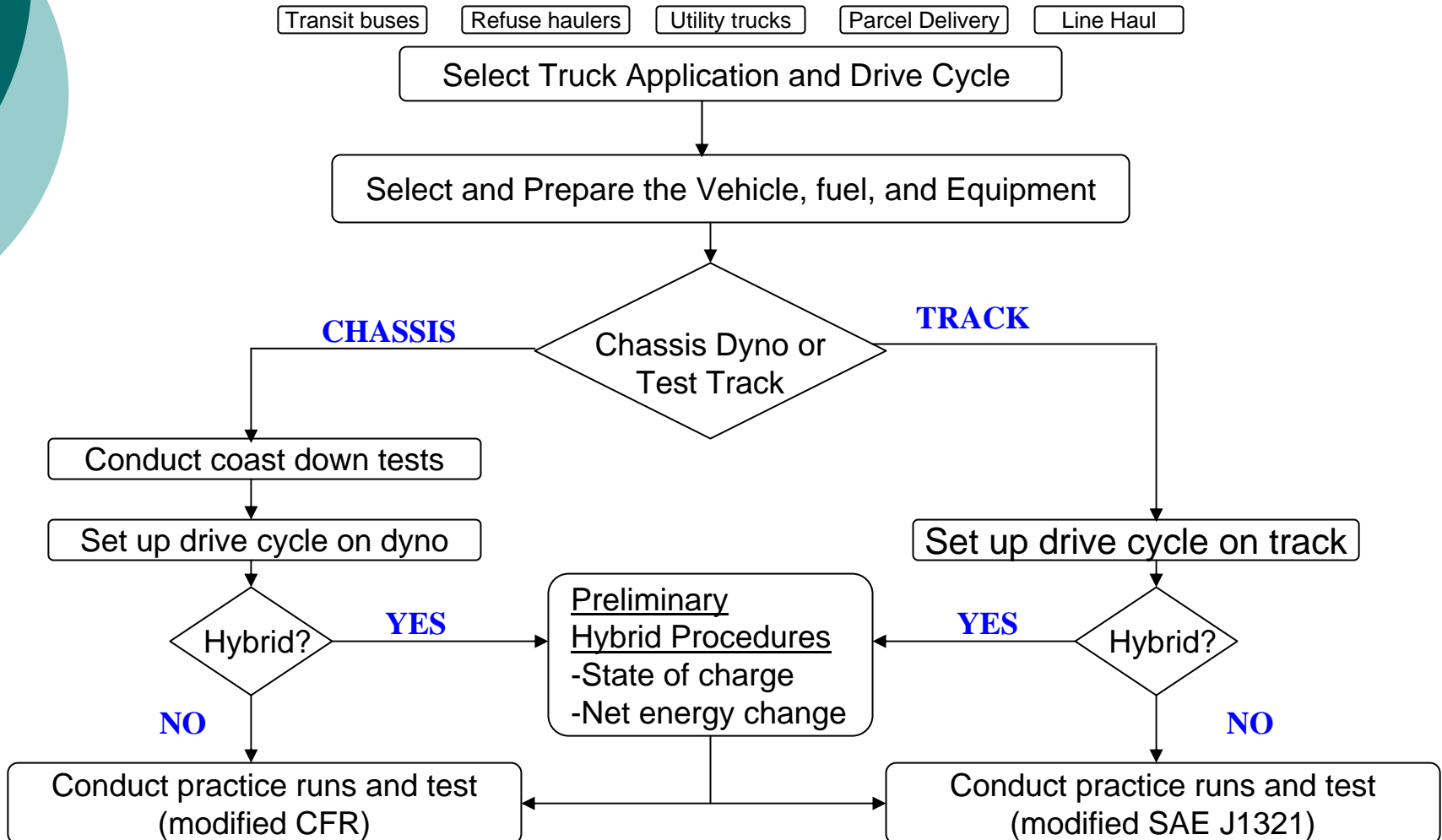
- Single Truck Test
 - Will measure FE in absolute (not relative) mpg or other metric (e.g., ton-mile/g; gallon/hr)
- Conduct on test track or HD chassis dynamometer
 - Track test modifies SAE J1321, "Joint TMC/SAE Fuel Consumption Test Procedure Type II," for heavy duty vehicles
 - Chassis test modifies EPA Optional Chassis Certification for diesel vehicles (CFR 40 Part 86, Subpart B and §86.1863-07) test procedure
- Can be used for all heavy duty trucks including hybrid
 - Added requirements for hybrid trucks



Key Distinctions from Light Duty

- LDV test procedures were developed by conducting analyses on existing light duty test procedures, using data from federal test program
- Lessons learned from LD cannot be readily applied to HD without the benefit of significantly more NEW data and testing
 - Data gaps – What are representative drive cycles, including variations in how trucks are driven? How is load characterized? What are the relationships between accessory load and vehicle fuel efficiency?

Flowchart



Overview of Test Method Selection

- Select vehicle and pre-condition
- Select drive cycle based upon application
 - Several initial drive cycles could be included
 - Select and analyze test fuel
 - Fuel must meet EPA test fuel requirements
- Select auxiliary load according to vehicle and drive cycle
 - Accessory load
 - Payload

Overview of Test Method

Preparation

- Calibrate equipment and settings
 - Refer to SAE J1321 for portable tank and 40 CFR Part 1065 Subpart D & Part 86 for PEMS, lab
- Conduct coast-down tests as needed
 - Refer to SAE J2263 and J2264
- Prepare track and/or chassis dynamometer
 - Map test cycle onto track with markers
 - Convert coast down data and drive cycle into dynamometer settings/VDA
- Additional requirements for hybrid vehicles
 - Calculate state of charge and net energy change in accordance with SAE 2711 Section 4
 - May require pre-test runs to stabilize energy storage charge levels

Overview of Test Method

Test & Calculate Results

- Conduct warm-ups/test runs
 - Number depends upon the drive cycle and whether track or chassis test
 - Environmental conditions in accordance with CFR 40 Part 86 Subpart B and §86.1863-07 (chassis); for track, test will establish temp, wind, altitude and humidity ranges
- Measure fuel used
 - Follow appropriate method for track, PEMS or laboratory, as cited in J1321 or in CFR 40.
- Review test data and repeat as needed
- Calculate results
 - For carbon balance, refer to CFR 40 Parts 1065 and 600; for gravimetric, refer to SAE J1321

Outstanding Technical Areas

- Representative drive cycles
- Representative load characterizations
 - Power draw per accessory
 - Accessory weighting per drive cycle
 - Must include PTO loads for vocational trucks (very important in HD hybrid designs)
- Testing, modeling and analysis to:
 - Verify drive cycles and refine test procedure
 - Quantify differences between chassis and track test (Initial protocol allows either method)
 - quantify differences between PEMS and lab equipment – underway
- Analysis to determine appropriate fuel efficiency metrics
 - Industry strongly favors a ton-mile which better captures the “work” HD vehicles do, and the benefits of hybrid designs
- Analysis to determine appropriate supplementary models
 - Must be accepted by government and industry; non-proprietary, accurate

Drive Cycles

- Objectives
 - Application-based
 - Provide comparable results on track or chassis
 - High fuel use or strong hybrid potential (initial focus)
- Completed drive cycles
 - Refuse hauler - Automated Side Loader Cycle
 - Transit bus - Manhattan and Orange County options
- Drive cycles in development/under review
 - Line haul, regional haul, utility, delivery
 - EPA working with DOE, HTUF, NESCAUM, NREL, W. Virginia University, and industry to collect and analyze more in-use data
- Interest in port operations could result in dray truck (port-to-rail) cycle
 - Several draft cycles developed by California and Texas, working with EPA

Testing Needs

- Testing will require substantial support by EPA and our partners
 - Results of testing could lead to need for additional tests
- Instrument trucks to collect data to refine drive cycles and characterize driving behavior
 - Collaboration with fleet partners
- Track, lab and chassis tests to verify drive cycles and to characterize load requirements
 - Collaboration with TMA, EMA, Tier I suppliers
- Modeling and analysis on test results to refine initial drive cycles and load requirements
 - Collaborate with DOE, other stakeholders
- “Round robin” tests to demonstrate test procedure
 - Collaborate with TMA

Stakeholders

- Industry, academic, states, and NGOs
 - Calstart-WestStart/HTUF, International, and EPA R&D group for delivery truck drive cycles
 - University of Texas, SwRI, and POLB/POLA for dray truck drive cycles and vehicle characterization
 - NESCAUM, SwRI, and industry stakeholders for linehaul truck drive cycles
 - OshKosh, Mack, Volvo for refuse truck drive cycles, accessory load, and vocational work load
 - NYC, bus working group for transit bus drive cycle and accessory load
 - Allison and Eaton for utility truck drive cycles, accessory load, and vocational work load
 - SAE 2711 working group for accessory load characterization, multiple truck types
- ORD, Environment Canada
 - Test facilities, other testing resources
- DOE
 - Modeling to validate and supplement testing
 - Data collection and analysis on linehaul truck fleet
- EPA encourages other organizations to join stakeholder groups

HD Fuel Economy Measurement Protocol

Milestones

- Spring 2007: Hybrid and FE drafts combined into one outline
- Spring/Summer 2007: Initial draft and review completed
 - Identifies and asks for comment on key technical issues that are not yet resolved
- Summer/Fall 2007: Incorporating changes
- Fall/Winter 2007: 2nd internal review and revision
- Winter 2007/2008: Engage key external stakeholders and solicit public comment
 - Academics
 - Industry (EMA, TMA, TMC, TTMA, HTUF, equipment suppliers)
 - Environmental groups
 - Other federal organizations

Looking Ahead

- EPA, with broad industry, academic, and other federal agency support, produces a test to measure the fuel economy of any heavy duty truck
- Test could be used to as metric for SmartWay designation, hybrid tax credit, etc.
- Once a base truck is tested, certain changes to that base truck could be potentially be modeled
 - Approach strikes a balance between two extremes - test every single truck (thousands of truck configurations, sold in low-volume), or don't test any trucks (modeling-only FE metric adopted by Japan)
- EPA and TMA recently met to map out how a hybrid approach might work
 - Need to determine what truck changes could be modeled versus tested; what data needed for model inputs and how to collect data; what model/s to use



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